2016 Fire Weather Program Annual Summary

Covering Central and Northeast Oregon, South Central and Southeast Washington

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Rail Fire September 2nd 2016. Photo Credit: Hiram Rooper (Inciweb)

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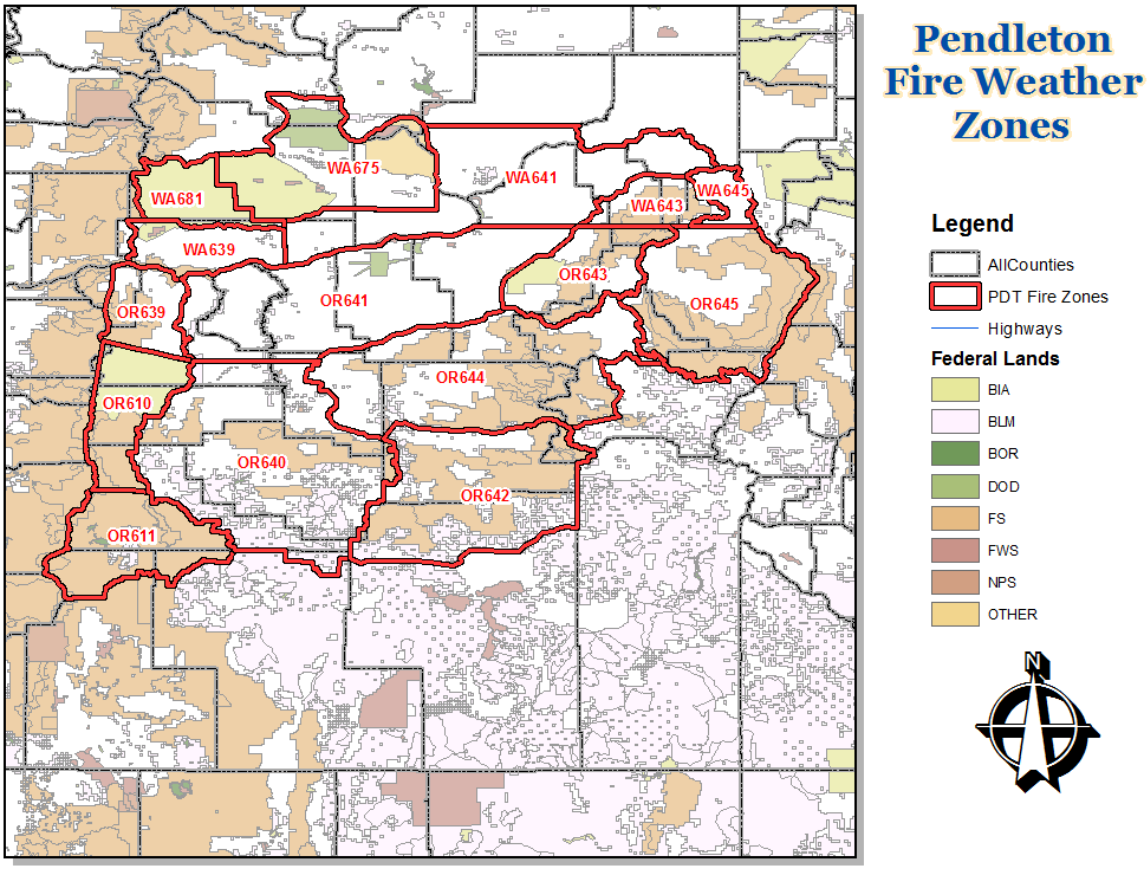
Fire Weather Zone Map with Federal Land Ownership



Fire Activity Summary

The number of wildfires and the acres burned across Washington and Oregon in 2016 were considerably less compared to 2015. There were 2,464 reported fires totaling 498,507 acres in 2016. In 2015, there were 4,603 reported fires and 1,823,473 acres burned.

The first large fire in NWS Pendleton's forecast area began in the middle of spring. A 3000-acre grass fire quickly spread west of Hermiston on May 23 which caused Interstate 82 to close. Four motorcycles and three vehicles were involved in an accident due to heavy smoke. There were injuries but no fatalities. After the unfortunate incident, many grass fires were reported across the Columbia Basin during the remainder of spring—a good indicator of how dry the fine fuels were in the forecast area at the start of the fire weather season.

The Akawana Fire, ignited by lightning on June 7, required the attention of Oregon Department of Forestry's Type I Incident Management Team. The fire was located about 13 miles east of Sisters and burned 2,094 acres before it was contained around June 13. Typically, wildfire season in eastern Washington and eastern Oregon begins around July 1, so the Akawana Fire was an early-season wildfire. There was a heat wave in early June with record high temperatures and some locations reaching the 100-degree mark. The hot and dry conditions in early June followed by thunderstorms with cloud-to-ground lightning on June 7 contributed to the wildfire. Fortunately, temperatures during the last two weeks of June were more seasonal with occasional showers and thunderstorms that helped alleviate the threat of additional wildfires.

July was cooler and wetter than average for most locations, especially during the first half of the month. Any fires that developed were quickly contained. By the end of July and early August, fire season took off throughout the western U.S. when it became hot and dry. Eastern Washington and eastern Oregon were no exception.

On July 30, the Weigh Station Fire near Meacham forced the closure of Interstate 84 on both westbound and eastbound lanes for almost 24 hours as well as Level 3 evacuations for homes near Deadman Pass. Although the cause of the fire is unknown, dry vegetation, low humidity and gusty winds created extreme fire behavior and rapid fire spread. The 688-acre fire was contained around August 5.

Another fire began on July 30 and became the largest wildfire in Washington in 2016. The Range 12 fire, located 12 miles north of Sunnyside, quickly grew to 176,600 acres in dry sage and grass under gusty winds. The Range 12 fire covered more than half of all of the wildfires in Washington (308,219 acres) in 2016. The fire was contained on August 7. The cause of the fire is unknown.

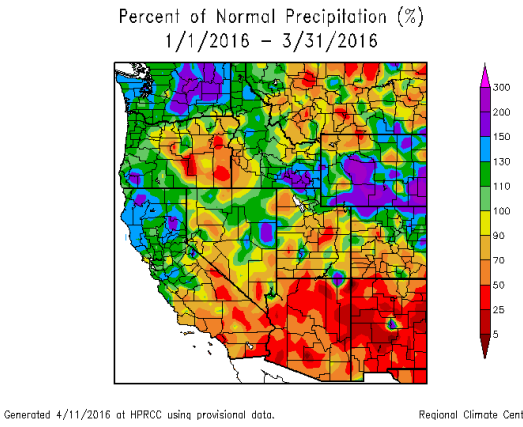
The largest wildfire in Oregon in 2016 was also in NWS Pendleton's fire weather forecast area. The Rail Fire, located five miles west of Unity, grew to 41,716 acres. Suppression efforts were difficult due to the excessive heavy dead and down fuels and steep terrain. The fire began on July 31 and was under mop-up on September 7. The cause of the Rail Fire is under investigation.

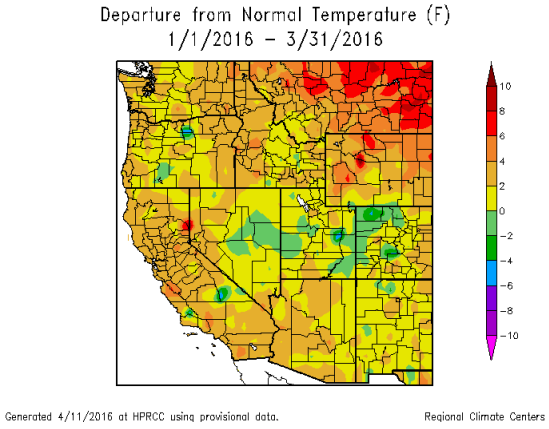
Out of the 1,184 large fires in Oregon, only 274 were caused by lightning. Out of the 1,280 large fires in Washington, only 140 were caused by lightning.

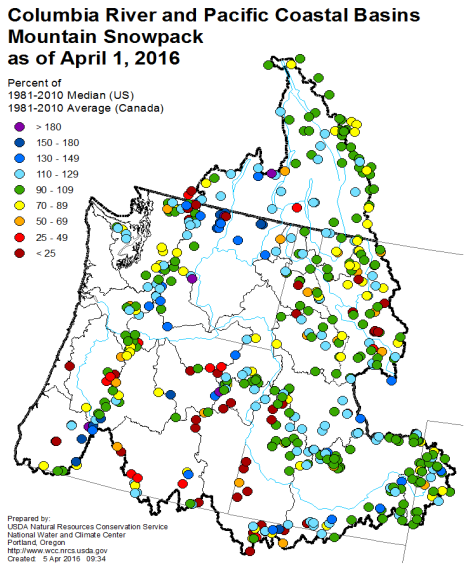
Weather Review

Winter (January – March)

The first two weeks of **January** were relatively dry and stable but the remainder of the month was marked by a progressive flow pattern bringing periods of rain, snow and gusty winds. Snow levels were often high and mountain snowpack was below average. The only exception was in central Washington where snowfall was close to 200 percent of normal in parts of Yakima and Kittitas Counties. The above seasonal temperatures were reported throughout **February**, and many areas observed the warmest monthly temperatures on record. Total precipitation was variable for the month, ranging from 15 to 30 percent of normal in parts of Central Oregon to 50 to 90 percent of normal for the rest of the forecast area. Precipitation in February was 100 to 150 percent of normal for the northern Blue Mountains and the east slopes of the Washington Cascades, although mountain snow still fell short of average over most of eastern Oregon. **March** 2016 was characterized by continued warm temperatures, and precipitation amounts varied from near normal in central and northeast Oregon to well above normal (approximately 300% of monthly average) in central Washington. A series of storm systems brought gusty winds to many locations during the month.

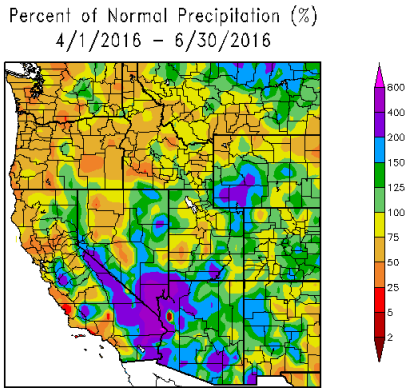






Spring Prescribed Burn Season (April – June)

April 2016 was clearly a warm and dry month for most of the area. Average temperatures were approximately 5 to 10 degrees above monthly average, and many daily and monthly records were met. Precipitation was generally below to well below average, although a few stations in Walla Walla and Wallowa counties reported precipitation amounts that were above monthly average. Snowfall was nearly non-existent—not only for the lower and mid elevations but also the higher elevations. As of May 1, mountain snowpack was 25 to 50 percent of average. The first ten days in **May** were similar to April in terms of warm and dry conditions, but the weather turned cooler and more unsettled during the middle of the month. Many locations reported daily rainfall records on May 13. The unsettled conditions continued the remainder of the month, but it became warmer and unstable, resulting in thunderstorms that produced heavy rain and localized flooding. By the end of the month, most locations reported above seasonal precipitation and a few locations in the top five of the wettest monthly precipitation on record. **June** temperatures were above average across the entire region, ranging from approximately 1 to 5 degrees above normal. Total monthly precipitation was generally slightly below average, mainly ranging from 50 to 90 percent of normal. The Eagle Cap Wildnerness, Elkhorn Mountains, and the high peaks of the Cascades continued with limited snowpack while snow had melted over the mountain zones.



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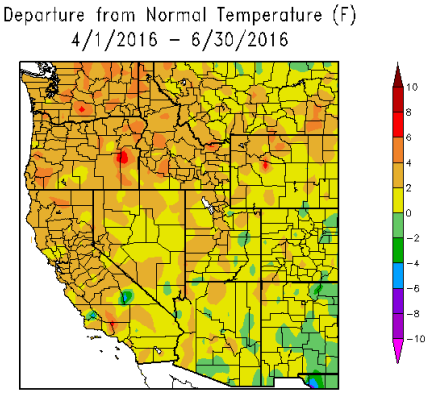

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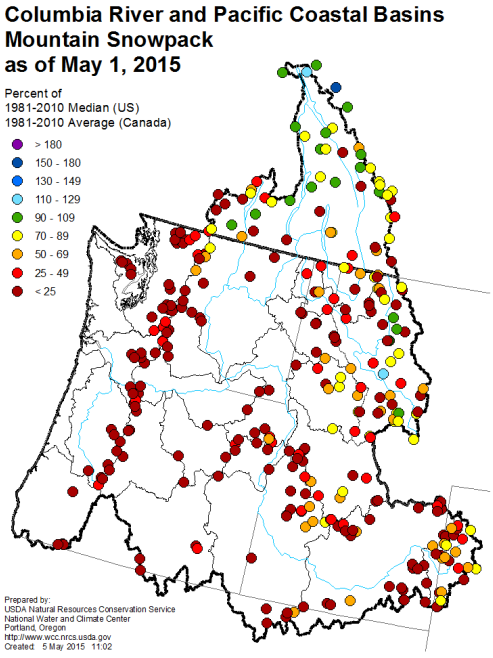
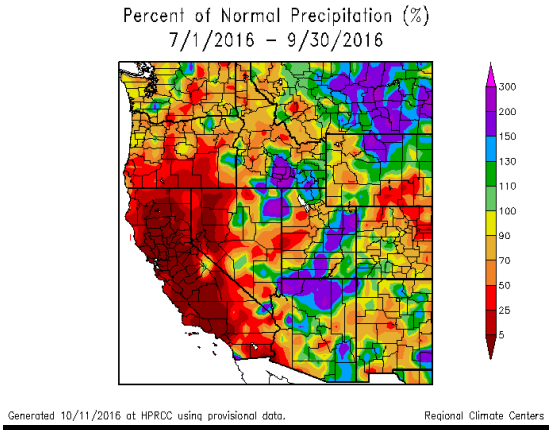
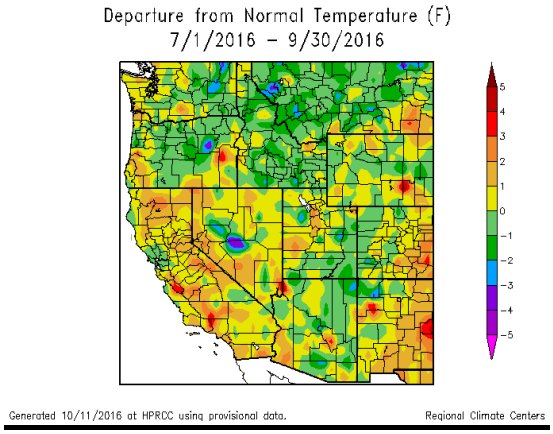


Summer Peak Fire Season (July – September)

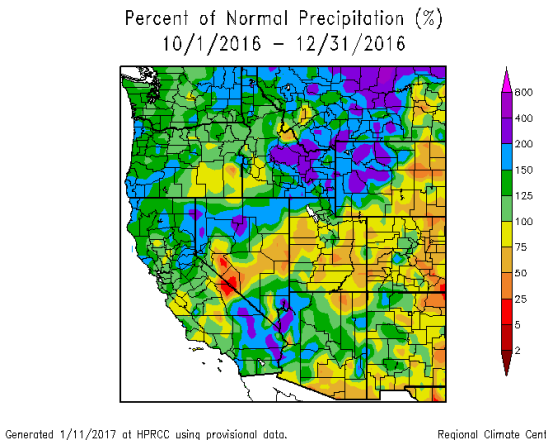
Cool and wet conditions were observed through the first three weeks of **July** with the heaviest precipitation caused by thunderstorms from July 6-12. Conditions dramatically changed to hot and dry the last week of July, and wildfires were reported throughout the area on July 30-31 when temperatures soared in the mid-90s to near 105 and the relative humidity fell into the single digits and teens along with gusty winds. **August** was notably hot and dry. Afternoon temperatures in the 90s to near 105 were commonly observed during the month. Only one storm system from August 5-8 produced appreciable rainfall. The rest of the weather systems primarily brought windy conditions. In general, temperatures in **September** were near to slightly below average and precipitation below average for the calendar month. In central Oregon, precipitation was only 25 percent of normal and several locations set or tied the minimum precipitation total for the month. Monthly precipitation totals for other locations were about 70 percent of normal. Most frontal systems in September brought light amounts of rain along with breezy winds. By the end of the peak fire season, the western U.S. Drought Monitor placed all of Oregon and Washington in the abnormally dry category and a small portion of northeast Oregon in the severe drought category.

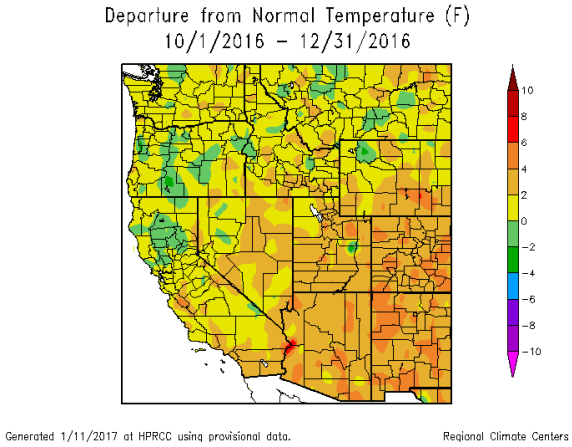




Fall Prescribed Burn Season (October – December)

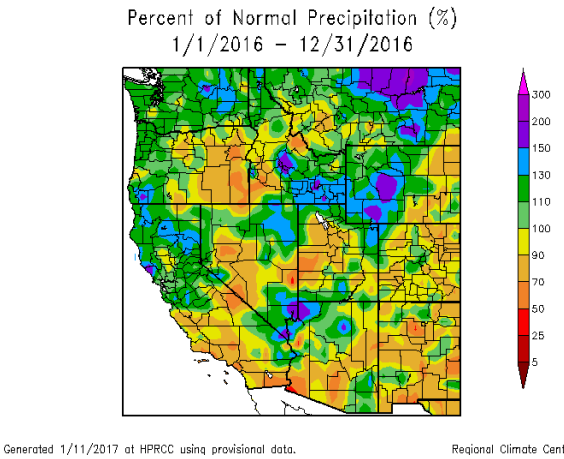
October 2016 was one of the wettest on record with near to above seasonal temperatures. Typically, daytime temperatures during the month were cool but the overnight low temperatures were unseasonably warm. Multiple weather systems were responsible for the significant precipitation—150 to 400 percent of average for the month. **November** was remarkably warm with temperatures about 6 to 12 degrees above seasonal average. However, the month was relatively dry. Occasional weather systems did bring precipitation to the area but not enough to meet monthly average. **December** was a dramatic change and many locations reported one of the coldest and/or the snowiest Decembers on record. As of January 1, 2017, the snowpack was 90 to 135 percent of normal. The wet October and December resulted in an improvement in the U.S. Drought Monitor, and most of the area was removed from any drought category.

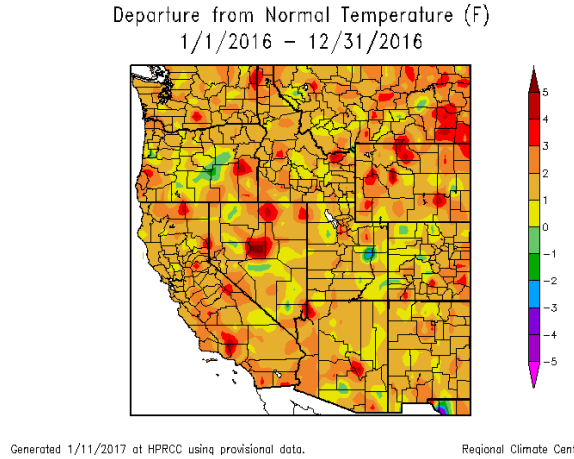




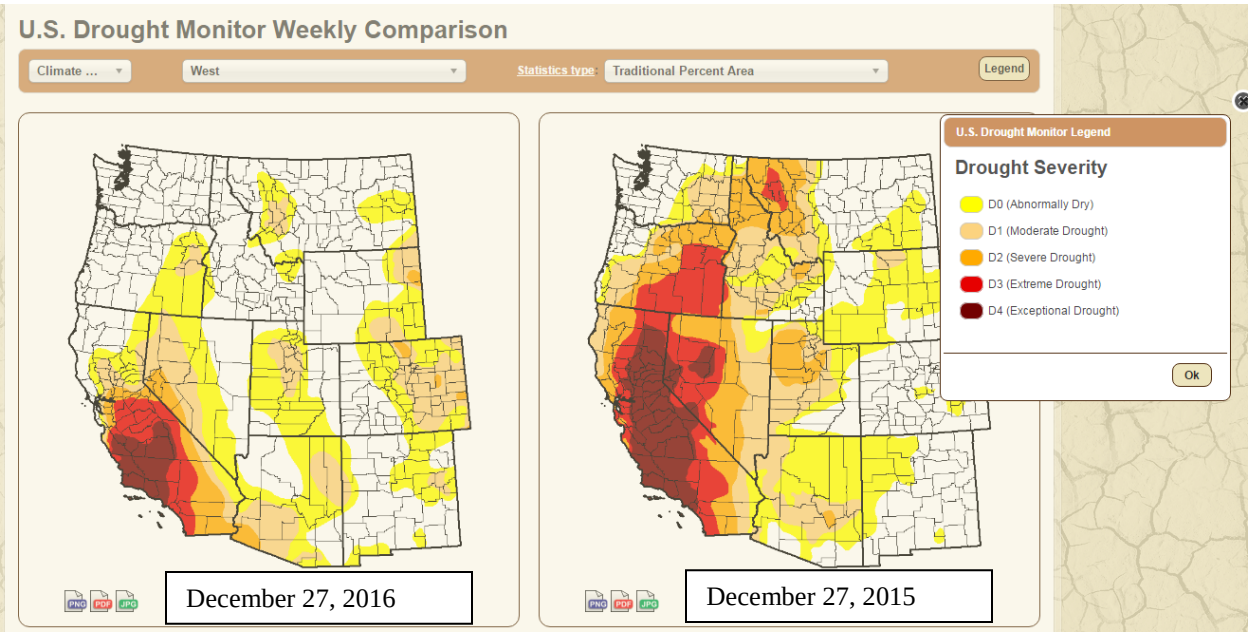
End of Year Conditions

The images below provide a 12-month precipitation and temperature summary ending December 31, 2016. With the exception of the latter half of May and most of July and December, the year was typically warm compared to average. A dichotomy of precipitation was noted from month to month. In general, the first three months were characterized by above normal precipitation and snowpack in central Washington to near and below normal precipitation and below normal snowpack in Oregon and southeast Washington. Most of the area experienced below average precipitation during the spring except for the latter half of May when showers and thunderstorms produced enough rainfall to exceed monthly precipitation average. The first three weeks of July were wet which is quite unusual for eastern Washington and eastern Oregon. The hot and dry conditions arrived during the last week of July and most of August. The fall prescribed burning season was notably wet in October but relatively dry in November. Winter came in full force in December with a full month of cold temperatures and periods of moderate to heavy snow.





Due to the wet conditions during October and December, almost all of the forecast area was removed from any drought category in the U.S. Drought Monitor.


U.S. Drought Monitor Weekly Comparison
Climate ...
West
Statistics type:
Traditional Percent Area
Legend
U.S. Drought Monitor Legend
Drought Severity
D0 (Abnormally Dry)
D1 (Moderate Drought)
D2 (Severe Drought)
D3 (Extreme Drought)
D4 (Exceptional Drought)
Ok
December 27, 2016
December 27, 2015

Number of Forecasts Issued

Month	Fire Weather Planning [1]	Spot Forecast			Red Flag Events		On Site IMET	NFDRS Fcst	Air Transport & Stability[1]
		Prescribed	Wildfire	HAZMAT, Search/ Rescue, & Drill Support	Fire Weather Watch	Red Flag			
Jan	0	0	0		0	0	0	0	34
Feb	0	3	0	8(HAZ)	0	0	0	0	30
Mar	37	32	0		0	0	0	18	33
Apr	42	71	0		0	0	0	21	30
May	46	56	6		0	0	0	23	33
Jun	63	17	20	1 (HAZ) 1 (S&R)	4	18	0	30	31
Jul	64	8	17		13	13	0	31	31
Aug	74	0	58	1(S&R)	22	37	30	31	31
Sep	60	77	11	1 (DS)	0	4	6	30	30
Oct	45	59	11		0	0	0	21	31
Nov	0	6	0		0	0	0	0	30
Dec	0	1	0		0	0	0	0	31
Total	**431**	**331**	**123**	**12**	**39**	**72**	**36**	**205**	**375**

[1] Includes non-routine forecast updates

Red Flag Warning Events and Verification

Date	Zones	Reason	Verification	Lead Time
June 1	WA639, WA641, WA675, OR610, OR611, OR639, OR640, OR641	Wind/Low RH	No – OR611, OR640 Yes – All others	26.46 hrs.
June 8	WA641, WA675, OR641	Wind/Low RH	No –WA641, WA675 Yes – OR641	25.73 hrs.
June 13	WA641, WA675, OR641	Wind/Low RH	No	
June 28	WA639	Wind/Low RH	Missed Event	
June 29	WA639, OR610, OR639, OR641	Wind/Low RH	No	
June 30	WA675	Wind/Low RH	No	
July 3-4	WA639, WA641, WA675, OR639, OR641	Wind/Low RH	Yes	26.32 hrs.
July 14	WA639, OR610	Wind/Low RH	Missed Event	
July 21-22	WA641, WA675, OR641	Abundant Lightning	Missed Event – WA641, OR641 No – WA675	
July 29-31	WA639, WA641, WA675, OR610, OR639, OR640, OR641, OR644	Wind/Low RH	Missed Event – OR644 Yes – All others	24.95 hrs.
August 2	WA641, WA675, OR640, OR641, OR642	Wind/Low RH	Yes – WA641, WA675, OR641 No – OR640, OR642	23.86 hrs.
August 5-6	WA643, WA645, OR611, OR640, OR643, OR644, OR645	Abundant Lightning	Yes – OR611, OR640, OR644, OR645 No – All others	28.35 hrs.
August 13-14	WA639, OR639, OR641	Wind/Low RH	Yes	16.80 hrs.
August 18-19	WA639, WA641, WA675, OR610, OR611, OR640	Wind/Low RH	Yes – WA639, WA675 No – All others	16.03 hrs.
August 21	WA639, WA641, WA643, WA675, OR639, OR640, OR641, OR643	Wind/Low RH	Yes	18.40 hrs.

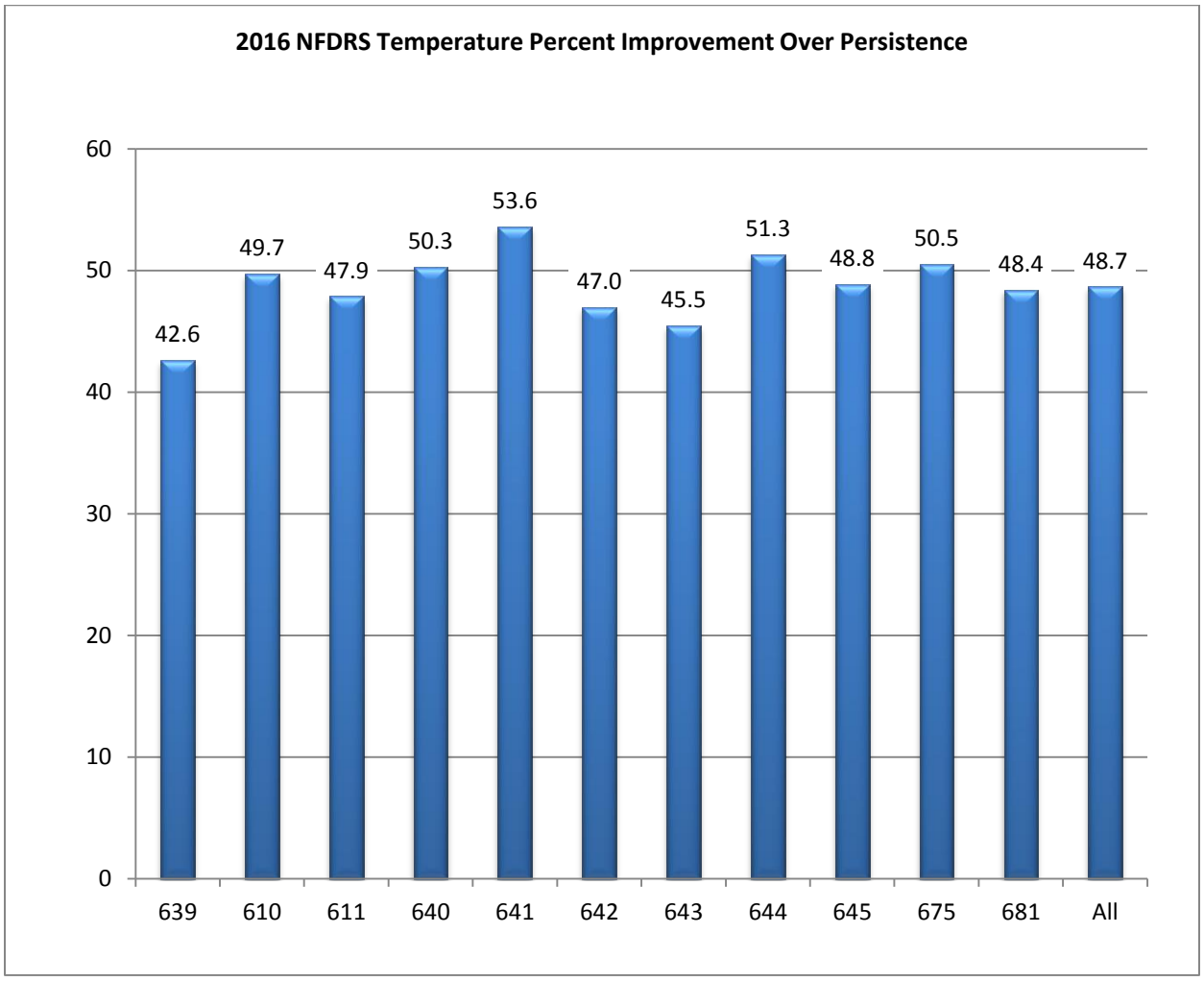
August 27	WA639, WA641, WA675, OR639, OR641	Wind/Low RH	Yes – WA641, WA675, OR641 No – All Others	26.41 hrs.
August 29	OR642, OR645	Haines 6/Low RH	Yes	20.59 hrs.
August 31	OR642	Wind/Low RH	Missed Event	
September 12	WA639, WA641, WA674, OR641	Wind/Low RH	Yes	24.73 hrs.
				Average: 23.19 hrs.

	All Warnings	Lightning	Synoptic (Low RH combined with Wind or Haines 6)
Warnings Issued:	73	9	64
Verified Warnings:	48	4	44
Unverified Warnings:	25	5	20
Missed Warnings:	7	2	5
Probability of Detection:	0.87	0.67	0.90
False Alarm Ratio:	0.34	0.56	0.31
Critical Success Index:	0.60	0.36	0.64

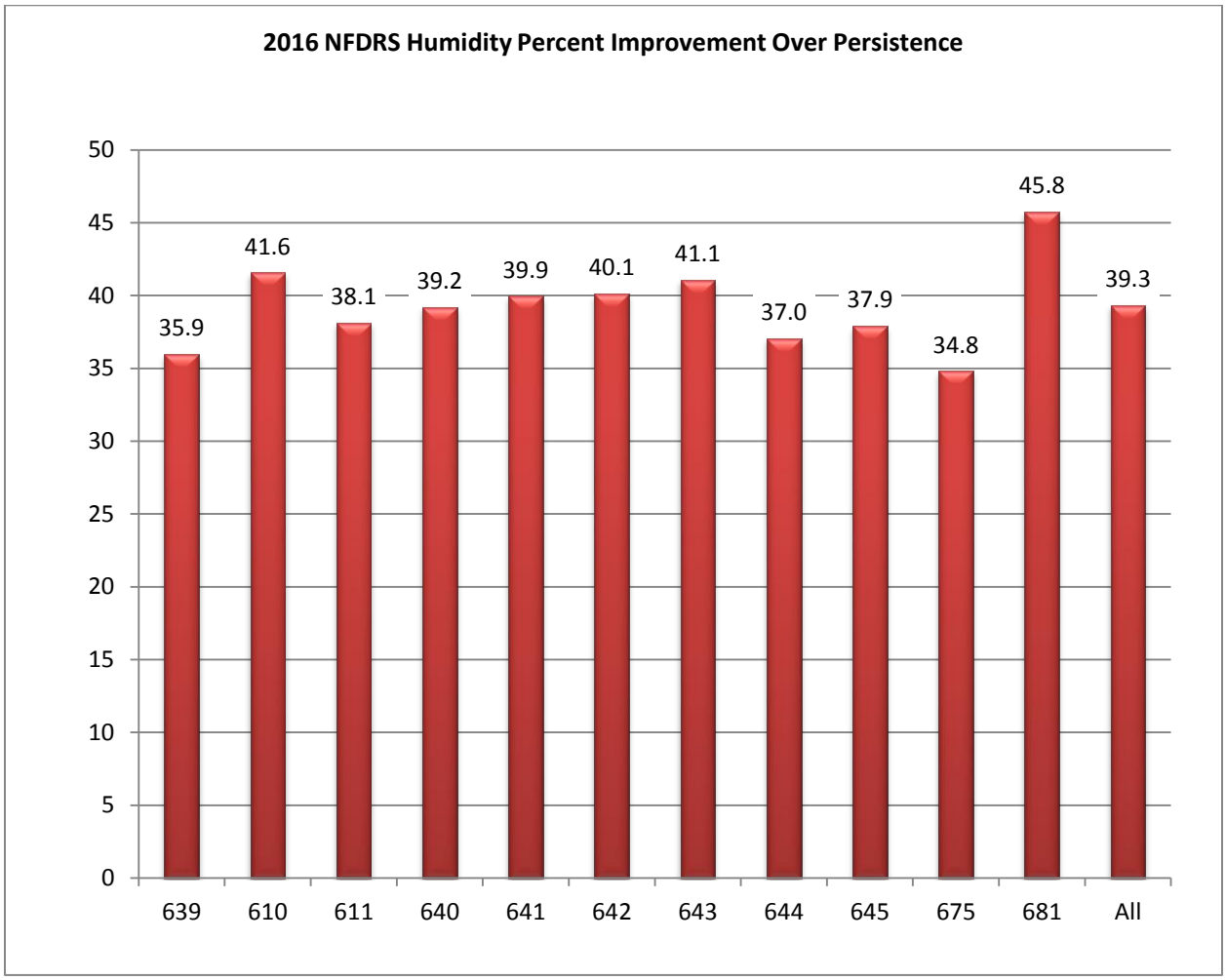
Note: For highest accuracy, False Alarm Rate (FAR) should approach 0.00 with Critical Success Index (CSI) and Probability of Detection (POD) nearing 1.00.

National Fire Danger Rating System Forecast Verification

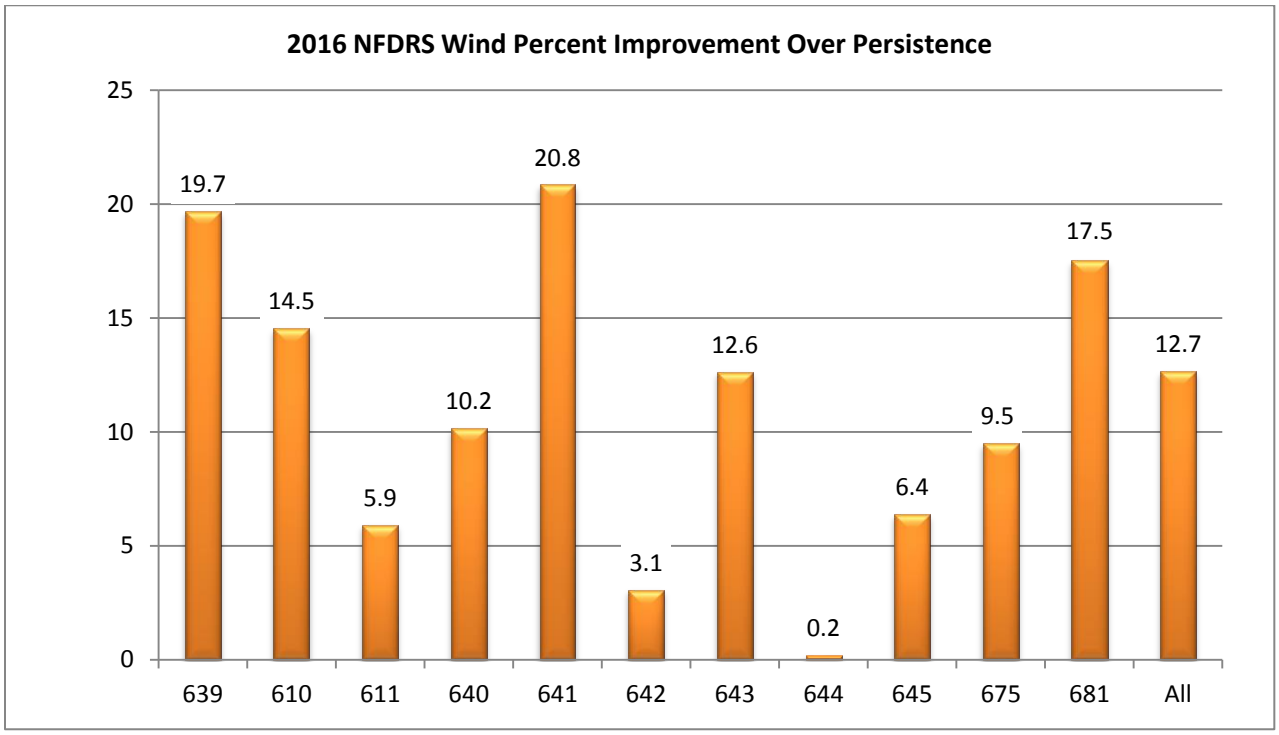
National Weather Service Offices provide input into the National Fire Danger Rating System via next day forecasts covering a variety of weather and weather related elements. Forecast comparisons against actual observations taken the following day at 1300 PST (1400 PDT) determine the amount of error with 1 point counted for each degree or mph of difference. The following charts show NWS Pendleton forecast percentage improvement over a persistence forecast for temperature, relative humidity, and wind speed averaged across each zone followed by the average of all stations in the final column. The June 1 through September 30 time frame is covered.



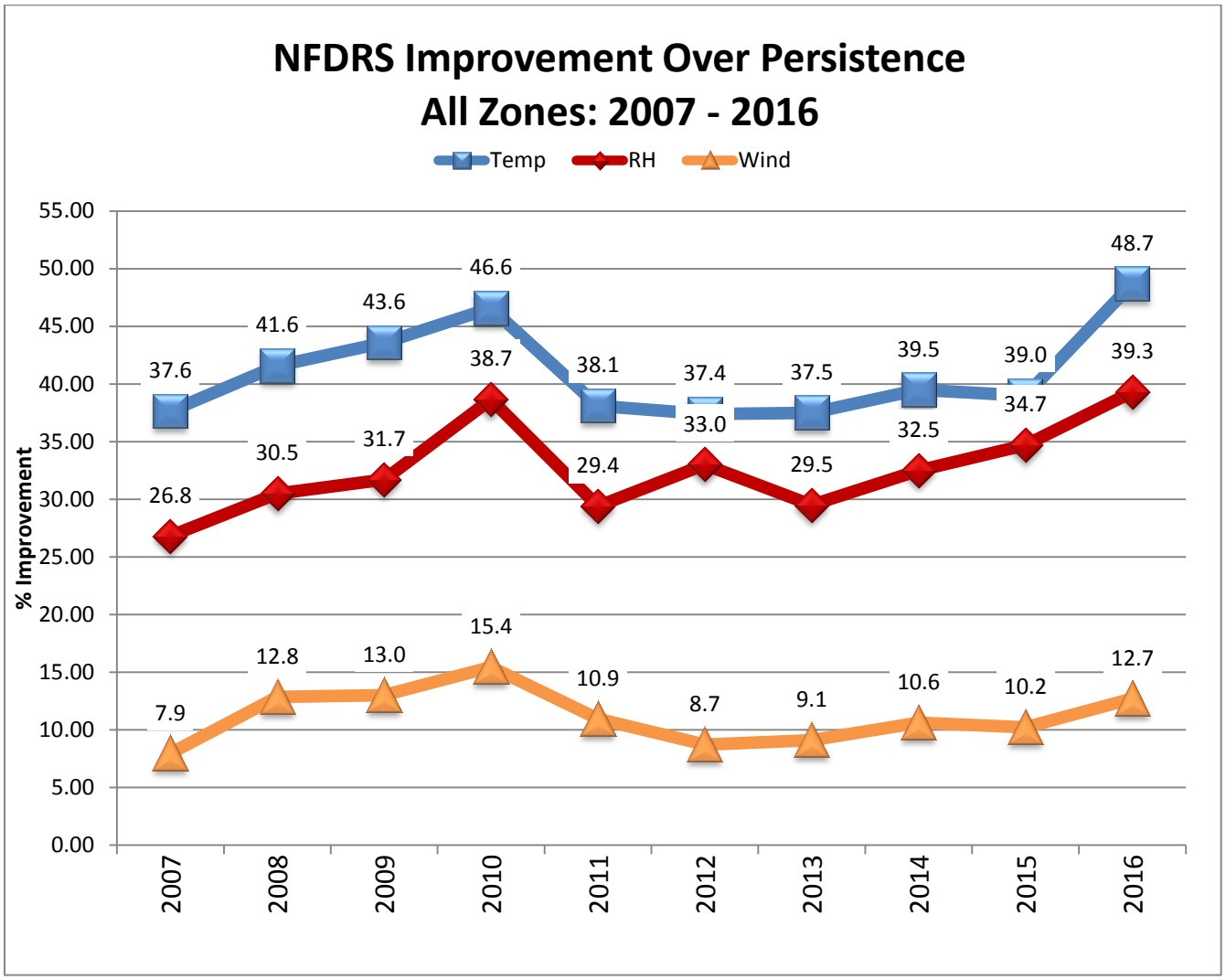
Temperature verification (above) for the entire Pendleton forecast area was higher in all zones compared to 2015 with a 48.7% improvement over persistence compared to 39.0% last year. The office goal is to maintain an improvement of 35% or greater which was accomplished in all zones this year.



Humidity verification (above) rose to 39.3% improvement over persistence this year compared to 34.7% in 2015. The office goal is to maintain an improvement of 25% or greater which was accomplished in all zones this year.

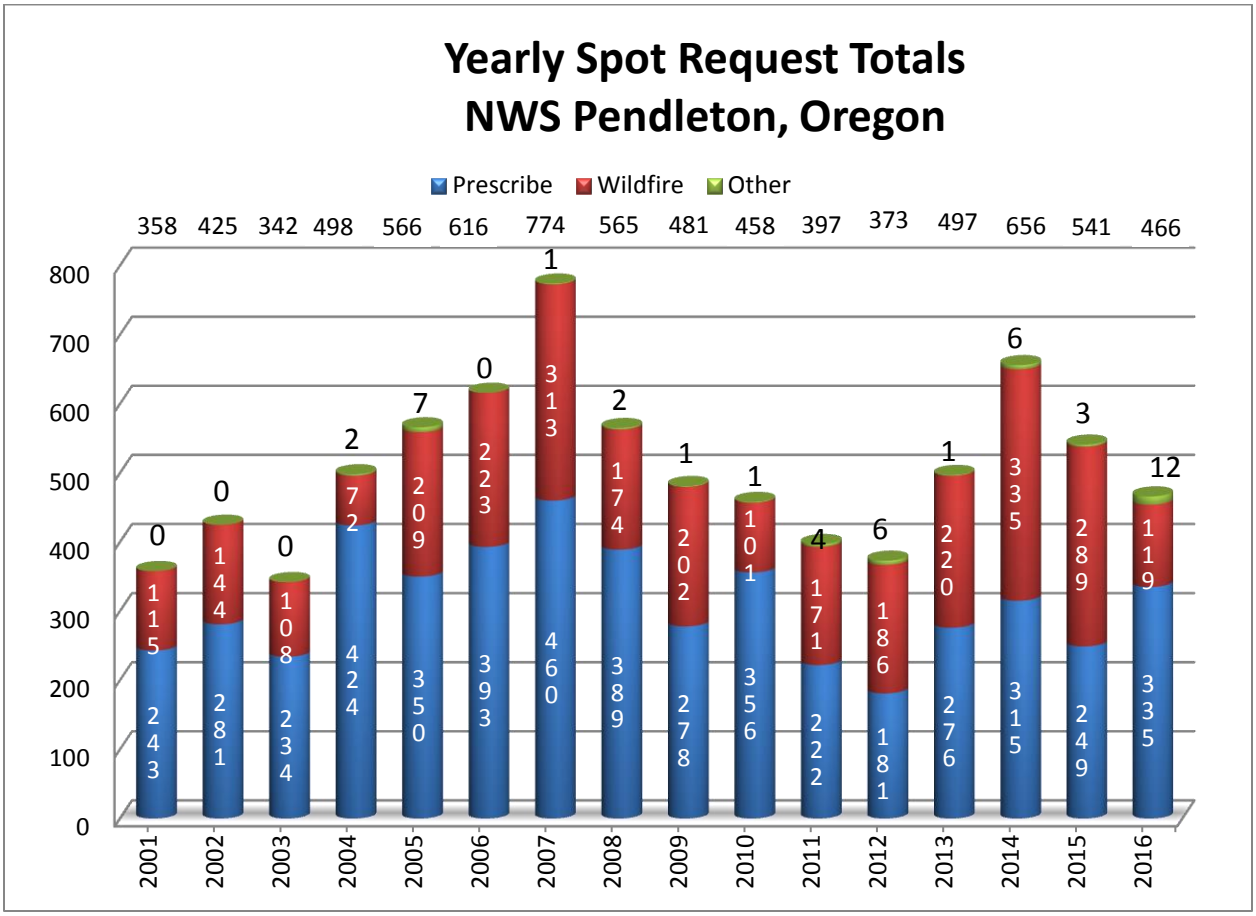


Overall wind verification (above) was slightly higher compared to 2015 with a 12.7% improvement over persistence compared to last year's 10.2%. Our office goal is 10% improvement over persistence. This was not met for the mountainous zones of 611, 642 and 644.



10 year trend graph (above) showing forecast improvement over persistence for NFDRS forecasts. Overall, yearly NFDRS verification data and trends for the Pendleton office were showing a gradual improvement over persistence through 2010, but trended downward through 2012. Improvement over persistence has now been slowly trending back up since 2014. Performance goals are improvements greater than 35% for temperature, 25% for relative humidity, and 10% for wind speed. Note: Technological improvements allowed NFDRS zone average trend forecasts to be switched to individual station trend forecasts in 2008. PDT fire weather zones changed in 2014 and some NFDRS stations were eliminated from the forecast package.

Spot Forecast Totals



The chart above shows the 15-year trend of spot forecasts issued by the Pendleton office. The total number of spot forecasts (466) issued by the Pendleton weather office this year has declined over the past three years, but the number of prescribed burn spots is the highest since 2010. There were 335 prescribed burn spot forecasts (86 more than the previous year) and 119 wildfire spot requests (a decrease of 170 from 2015). The number of HAZMAT and Search-and-Rescue spots were the highest in 15 years with a total of 12.

IMET dispatches

Incident Meteorologists (IMET) provide on-site support for a variety of incidents where weather forecast and monitoring information is essential to emergency responder safety. There were three IMET dispatches from NWS Pendleton this year for 44 days on incident. Assignments are listed below.

Dates	IMET	Incident	Location
6/23 – 6/28	Wister	Cedar Fire (Trainee)	Show Low, AZ
8/1-8/16	Wister	Pioneer Fire (Trainee)	Idaho City, ID
8/16 – 8/31	Cobb	Rail Fire	Unity, OR
9/24 – 9/29	Wister	Pioneer Fire	Idaho City, ID

Training and Outreach Activity

Training and outreach continues to be an important part of the fire weather program at NWS Pendleton. The following table lists training and activities for 2015.

Date(s)	Forecaster	Activity	Location
3/14 – 3/18	Cobb/Wister	IMET CEE Workshop Including RT-130 Fireline Refresher Training	Boise, ID
3/28–3/29	Wister	Annual FBAN/LTAN Meeting	Vancouver, WA
3/30	PDT staff	Annual Fire Weather Seminar	Pendleton, OR
4/9 –4/10	Cobb	S-290	Hermiston, OR
4/20–4/21	Cobb	Northwest Interagency Coordination Center AOP Meeting	Portland, OR
5/4	Cobb	Mid-Columbia Meeting	Hermiston, OR
5/5	Cobb	Malheur Rappel Group Meeting	John Day, OR
5/16	Cobb	S-390 Weather Training	Baker City, OR
5/16–5/20	Wister	S-390	Baker City, OR
6/13	Wister	S-190 Weather Training	Prairie City, OR
6/22–6/23	Cobb	S-290 Weather Training	Sisters, OR
7/21	Cobb	Rx “South Hill Burn” Outreach	Pendleton, OR